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| 09/785,416 | 02/20/2001 | Kiwamu Tanahashi | 11995/2 | 1923 |

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EXAMINER

UHLIR, NIKOLAS J

| ART UNIT | PAPER NUMBER |
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1773

6

DATE MAILED: 05/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicant N .

Applicant(s)

09/785,416

TANAHASHI ET AL.

Examiner

Art Unit

Nikolas J. Uhler

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) none is/are allowed.
- 6) ☒ Claim(s) 2-12 is/are rejected.
- 7) ☐ Claim(s) none is/are objected to.
- 8) ☐ Claim(s) none are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>6</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to the amendment/arguments dated 3/24/03. The applicants argument relating to the fact that the instant invention requires a perpendicular recording medium whereas that of the primary reference utilized by the examiner (Kanbe et al.) is directed towards a longitudinal recording medium is persuasive in overcoming the prior applied rejections. Accordingly these rejections are withdrawn. Further, applicant's amendment to the abstract is sufficient to overcome the prior objection. Accordingly, this objection is withdrawn. However, in light of the new grounds of rejection presented below, the case is not in condition for allowance. The examiner notes that the applicant has cancelled claim 1 and inserted new claims 13 and 14. Thus, claims 2-14 are pending. Further, the examiner acknowledges that the information disclosure statement dated 4/24/03 has been considered and that a signed/initialed copy accompanies this office action.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 14 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In the instant case, claim 14 recites "the non-metal layer." There is insufficient antecedent basis for this limitation in the claims. The examiner feels the applicant intended for the limitation to read "non-magnetic layer," as this is commensurate in scope with the specification. Correction is required.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 2-4 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (US2002/0064690) in view of Honda et al. (US5851643).

6. The limitations of claim 2 require a perpendicular magnetic recording medium comprising a soft magnetic underlayer on the surface of a substrate, a non-magnetic amorphous metal layer containing Ni on the soft magnetic layer, and a perpendicular magnetic layer formed on the non-magnetic amorphous metal layer.

7. With respect to these limitations, Chen et al. (hereafter Chen) teaches a magnetic recording medium suitable for **either** longitudinal or perpendicular recording that comprises a substrate, an amorphous layer of NiNb on the substrate, and a magnetic layer on the NiNb layer (sections 25-28 and 43).

8. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a perpendicular recording layer over the NiNb layer in Chen, as the layer structure is taught to be equivalent for forming either perpendicular or longitudinal recording media, which is ultimately determined by the c-axis orientation of the magnetic layer.

9. It is noted however, that Chen fails to teach a soft magnetic underlayer between the amorphous NiNb layer and the magnetic layer, as required by claim 2.

10. However, with respect to this deficiency, Honda et al. (hereafter Honda) teaches a perpendicular magnetic recording medium that comprises a substrate, one or more

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underlayers, and a magnetic layer, and teaches that if a soft magnetic underlayer is formed between the substrate and the first underlayer, a magnetic recording medium having low noise and high read back output can be produced. Suitable soft magnetic materials include Sendust, Permalloy, and alloys of Fe, Co, Zr, Mo, Nb and W (column 23, lines 50-67).

11. Therefore it would have been obvious to one with ordinary skill in the art at the time the invention was made to utilize a soft magnetic underlayer as taught by Honda between the substrate and the NiNb layer taught by Chen.

12. One would have been motivated to make this modification due to the teaching in Honda that the read back output and noise of a perpendicular magnetic recording medium can be improved by utilizing a soft magnetic underlayer between the substrate and the 1st underlayer of a magnetic recording medium.

13. The limitations of claim 3 require that the amorphous layer containing Ni additionally contain Zr. It is noted that Chen teaches that the amorphous NiNb layer can additionally contain one or more elements selected from B, W, Ta, Zr, and P (section 40).

14. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to add Zr to the NiNb layer in Chen, as Zr is recognized to be equivalent to the other additive elements listed by Chen as suitable.

15. The applicant is respectfully reminded that substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency.

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16. Claim 4 requires the amorphous Ni layer to contain both Zr and at least one element selected from Nb and Ta. This limitation is met as set forth above for claim 3.

17.

18. The limitations of claim 14 require that the magnetic layer be formed directly on the "non-metal" layer. For the purpose of this examination the examiner has interpreted "non-metal layer" to mean "non-magnetic layer," as this is commensurate in scope with the invention described in the specification and with the language of claim 2. In any case, claim 1 of Chen requires only a substrate, a NiNb layer, and a magnetic layer. Thus, in this 3 layer system, the magnetic layer would have to be formed on the NiNb layer, as the NiNb layer is taught to be formed between the substrate and the magnetic layer. Thus applicants claim 14 limitations are met by the combination of Chen with Honda.

19. Claims 5-9 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hokkyo et al. (US6387483).

20. Claim 5 requires a perpendicular recording medium comprising a soft magnetic underlayer having nano-crystals, which is formed on a substrate, and a perpendicular magnetic recording layer formed on the soft magnetic layer via a non-magnetic layer.

21. Regarding these limitations, Hokkyo et al. (hereafter Hokkyo) teaches a magnetic recording medium comprising a substrate, a Cr layer on the substrate, a soft magnetic layer on the Cr layer, and a perpendicular magnetic layer on the soft magnetic layer (column 9, lines 19-30). In addition, a nonmagnetic layer such as a layer of Ti or non-magnetic CoCr can be placed between the soft magnetic layer and the magnetic layer

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to improve the perpendicular orientation of the magnetic film (column 12, lines 32-24).

Thus, Hokkyo explicitly meets the bulk of the limitations of claim 5.

22. The examiner notes that Hokkyo does not explicitly teach that the soft magnetic layer is of a nano-crystalline form.

23. However, Hokkyo teaches that suitable soft magnetic materials for forming the soft magnetic layers include FeTaN (column 3, lines 8-25), and teaches that the soft magnetic layers are suitably made via sputtering in an atmosphere of argon gas, followed by an annealing step (column 9, line 19-column 10, lines 2). Further, the examiner notes that on pages 7 and 8 of the instant specification disclose that the nano-crystalline soft magnetic layers of the instant invention are obtained by annealing deposited Fe based soft magnetic layer such as FeTaC "or the like," or by sputtering an FeTa alloy in an atmosphere containing Ar and N. Furthermore, the FeTaN film of Hokkyo meets the compositional requirements of claim 9

24. While the examiner acknowledges that the process used by Hokkyo is not word for word identical with that utilized by the applicant, the methods are sufficiently similar that the examiner takes the position that a nano-crystalline soft magnetic layer will form via the method utilized by Hokkyo, in particular when FeTaN is utilized as the soft magnetic material and is formed by sputtering in argon and subsequently annealed.

25. The applicant is reminded that it has been held that where claimed and prior art products are identical or **substantially identical** in structure or **composition**, or are produced by identical or **substantially identical processes**, a *prima facie* case of either anticipation or obviousness has been established and the burden of proof is

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shifted to applicant to show that prior art products do not necessarily on inherently possess characteristics of claimed products where the rejection is based on inherency under 35 USC 102 or on *prima facie* obviousness under 35 USC 103, jointly or alternatively. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977).

“When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not.” *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). Therefore, the *prima facie* case can be rebutted by **evidence** showing that the prior art products do not necessarily possess the characteristics of the claimed product. *In re Best*, 562 F.2d at 1255, 195 USPQ at 433.

26. Regarding the property limitations of claims 6-8, the examiner feels that these limitations are met when sputtered and annealed FeTa_N is utilized as the soft magnetic layer in Hokkyo for the same reasons set forth above for claim 5.

27. The limitations of claim 9 require the soft magnetic layer to contain Fe as a first element, at least one of C and N as a second element, and at least one of Ta, Hf, Nb, Ti, and Zr as the third element. These limitations are met as set forth above for claim 5, when FeTa_N is utilized as the soft magnetic material in Hokkyo.

28. Claim 13 requires the nano-crystals to be ferromagnetic. The examiner takes the position that the sputtered and annealed FeTa_N film utilized by Hokkyo meets this limitation for the same reasons set forth above for claim 5.

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29. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen as modified by Honda as applied to claim 4 above, and further in view of Shimizu et al. (US2002/0012816).

30. Chen as modified by Honda as relied upon above for claim 4 does not teach the use of a soft magnetic layer containing Fe, Ta, and C, as required by claim 10.

31. However, it is noted that Honda teaches that suitable materials for use as a soft magnetic layer between a substrate and the first underlayer of a magnetic medium include Sendust, Permalloy, and alloys of Fe, Co, Zr, Mo, Nb and W (column 23, lines 50-67).

32. Bearing the materials of Honda in mind, Shimizu et al. (hereafter Shimizu) teaches a perpendicular recording medium comprising a substrate, underlayer, and magnetic layer, wherein a soft magnetic layer is placed between the first underlayer and the substrate (sections 19, and 78). Suitable materials for forming the soft magnetic layer include Permalloy, Sendust, and FeTaC (section 79).

33. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize FeTaC as taught by Shimizu as the soft magnetic layer utilized by Chen as modified by Honda.

34. One would have made such a substitution in light of the teaching by Shimizu that FeTaC is equivalent to Permalloy or Sendust as a suitable material for forming a soft magnetic layer between the substrate and a first underlayer of a perpendicular recording medium.

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35. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen as modified by Honda as applied to claim 2 above, and further in view of Nakamura et al. (US5738927).

36. Chen as modified by Honda teaches all of the recording medium limitations of claim 11 as set forth above. However, Chen as modified by Honda does not teach the apparatus limitations of claim 11.

37. With respect to this deficiency, Nakamura et al. (hereafter Nakamura) teaches an apparatus for reading a perpendicular recording medium, wherein the apparatus comprises a holder for a perpendicular recording media, a magnetic head for recording and reproducing information from the medium, moving means for moving the media relative to the magnetic head, wherein the reproducing portion of the head is a magnetoresistive head (column 4, lines 23-46).

38. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the recording apparatus of Nakamura to read and record data on the perpendicular recording medium of Chen as modified by Honda.

39. One would have been motivated to do so due to the teaching in Nakamura that such an apparatus is suitable for recording and reproducing data with perpendicular recording media.

40. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hokkyo as applied to claim 5 above, and further in view of Nakamura et al. (US5738927).

41. Hokyo as stated above for claim 5 teaches all of the media limitations of claim 12 except for the applicants' requirement that the soft magnetic underlayer comprise α -Fe

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nanocrystals. While the examiner acknowledges that Hokkyo does not teach this limitation, Hokkyo does teach the use of a soft magnetic underlayer meeting the compositional requirements of claim 9 that is formed by a substantially identical process to that stated on page 8 of the specification, which results in the formation of α -Fe nanocrystals from an Fe-Ta alloy. Thus, the examiner takes the position that this limitation is met.

42. Further, It is noted that Hokkyo does not teach the apparatus limitations of claim 12.

43. However, Nakamura teaches an apparatus for reading a perpendicular recording medium, wherein the apparatus comprises a holder for a perpendicular recording media, a magnetic head for recording and reproducing information from the medium, moving means for moving the media relative to the magnetic head, wherein the reproducing portion of the head is a magnetoresistive head (column 4, lines 23-46).

44. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the recording apparatus of Nakamura to read and record data on the perpendicular recording medium of Hokkyo.

45. One would have been motivated to do so due to the teaching in Nakamura that such an apparatus is suitable for recording and reproducing data with perpendicular recording media.

46. With regards to the combination of Nakamura with Chen as modified by Honda and Nakamura with Hokkyo, the examiner acknowledges that the recording medium utilized by Nakamura is different from that utilized by Chen as modified by Honda or

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Hokkyo. However, the apparatus claimed by the applicant and disclosed by Nakamura is quite generic, and does not include specific limitations that would require a particular type of perpendicular media to be utilized in order for the apparatus' to function. Thus, although the media utilized in Nakamura is different then that of the other cited prior art and that of the instant invention, one of ordinary skill in the art would be motivated to utilize the apparatus recited by Nakamura with a reasonable expectation of success.

Response to Arguments

47. Applicant's arguments with respect to claims 1-12 have been considered but are moot in view of the new ground(s) of rejection.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nikolas J. Uhler whose telephone number is 703-305-0179. The examiner can normally be reached on Mon-Fri 7:30 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on 703-308-2367. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-0389.

WJ
5/8/03


Paul Thibodeau
Supervisory Patent Examiner
Technology Center 1700